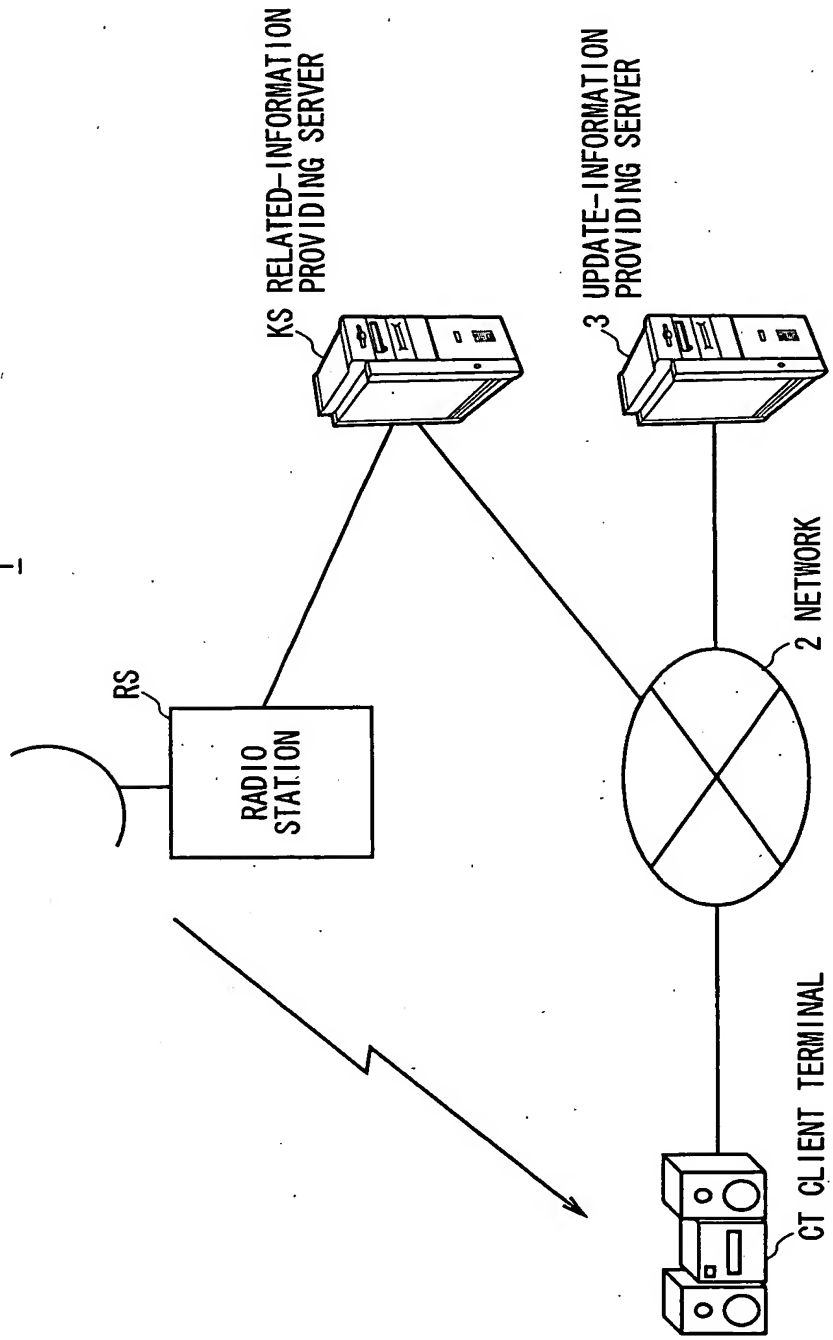
1
KS RELATED-INFORMATION PROVIDING SERVER
3 UPDATE-INFORMATION PROVIDING SERVER
2 NETWORK
RS
RADIO STATION
CT CLIENT TERMINAL

FIG. 1

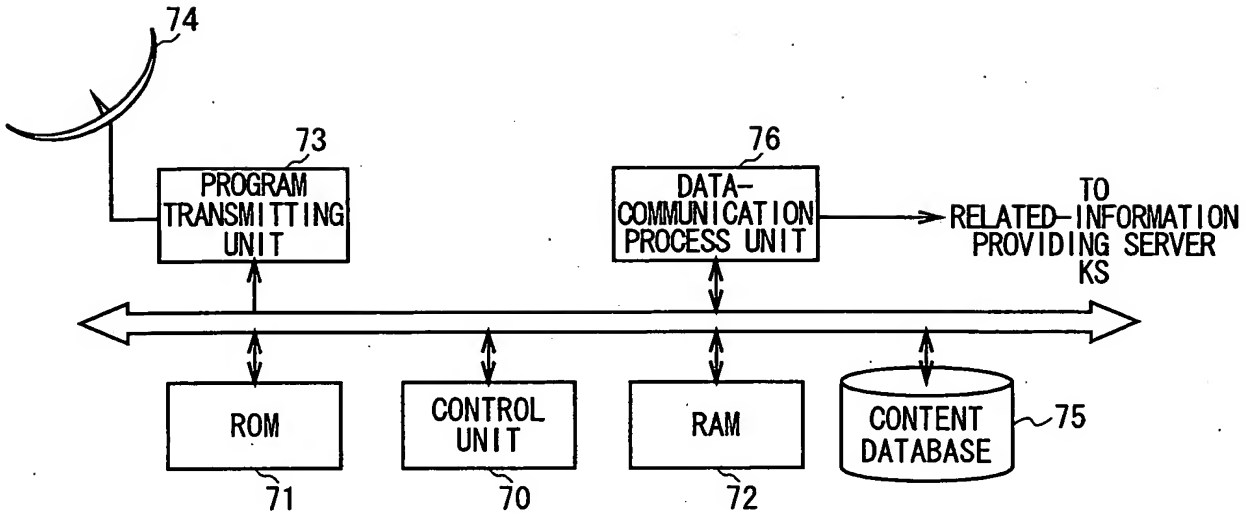
74
73
PROGRAM TRANSMITTING UNIT
76
DATA-COMMUNICATION PROCESS UNIT
TO RELATED-INFORMATION PROVIDING SERVER KS
ROM
71
CONTROL UNIT
70
RAM
72
CONTENT DATABASE
75

FIG. 2

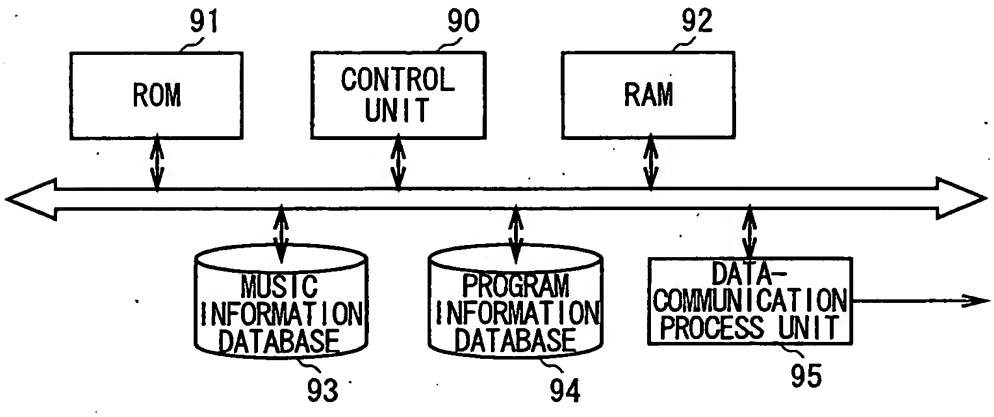
91
ROM
90
CONTROL UNIT
92
RAM
MUSIC INFORMATION DATABASE
93
PROGRAM INFORMATION DATABASE
94
DATA-COMMUNICATION PROCESS UNIT
95

FIG. 3

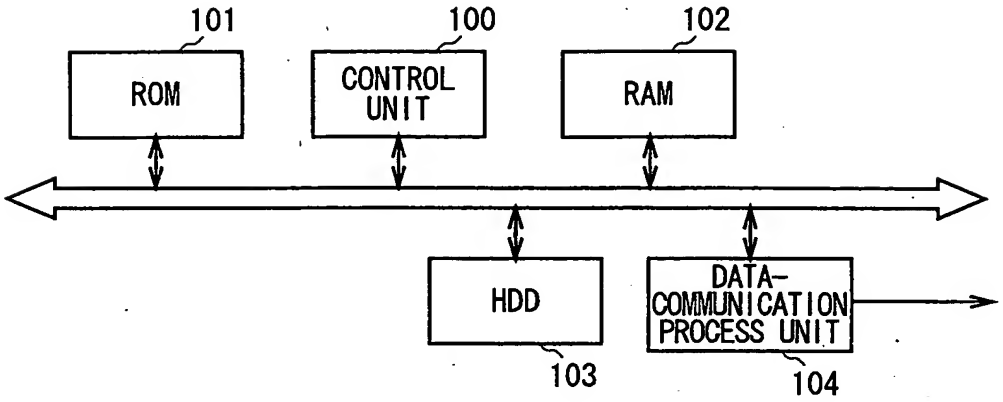
101
100
102
ROM
CONTROL UNIT
RAM
HDD
DATA-COMMUNICATION PROCESS UNIT
103
104

FIG. 4

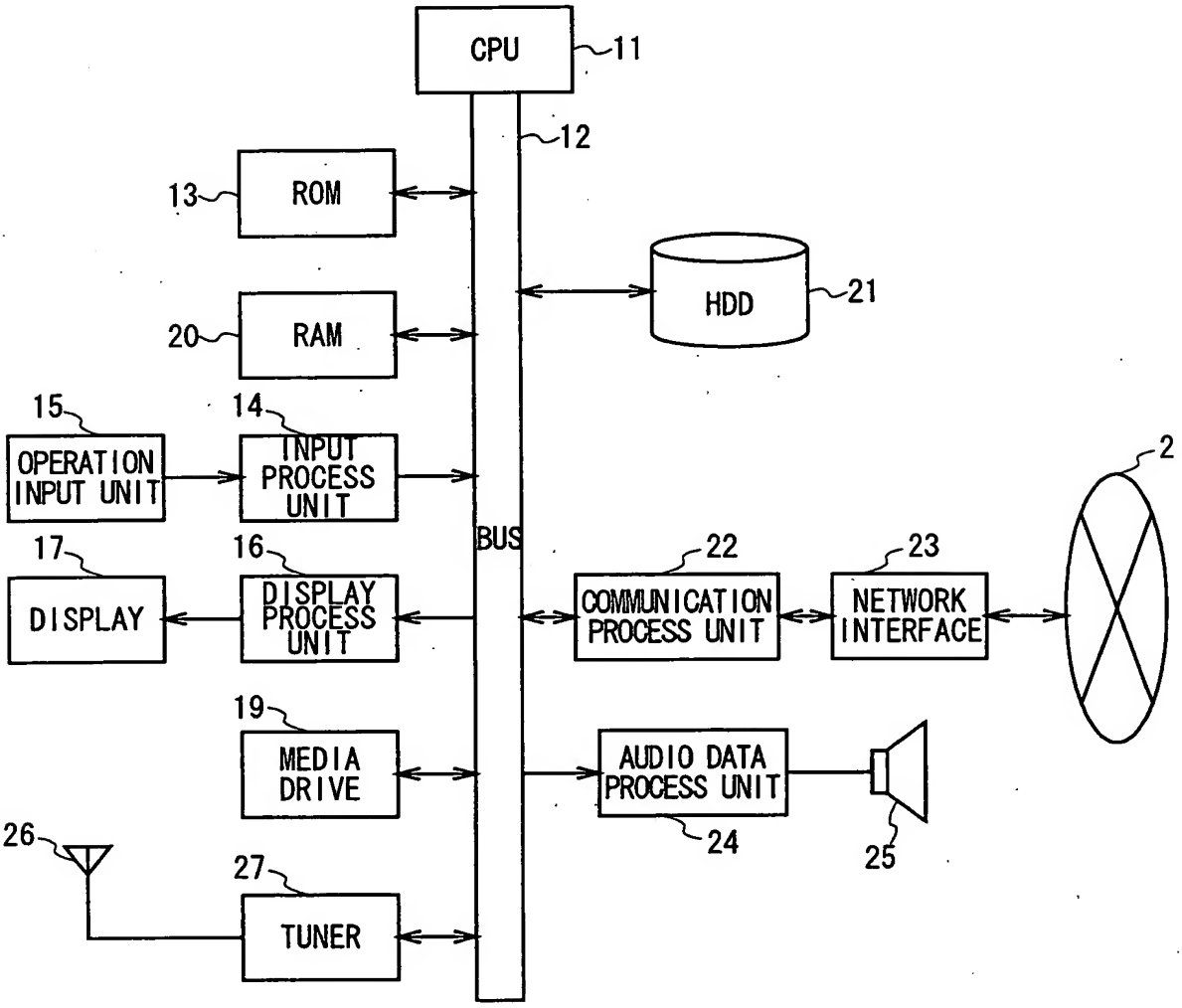
CPU
11
12
13
ROM
HDD
21
20
RAM
15
14
OPERATION INPUT UNIT
INPUT PROCESS UNIT
2
BUS
17
16
22
23
DISPLAY
DISPLAY PROCESS UNIT
COMMUNICATION PROCESS UNIT
NETWORK INTERFACE
19
MEDIA DRIVE
AUDIO DATA PROCESS UNIT
26
24
25
27
TUNER

FIG. 5

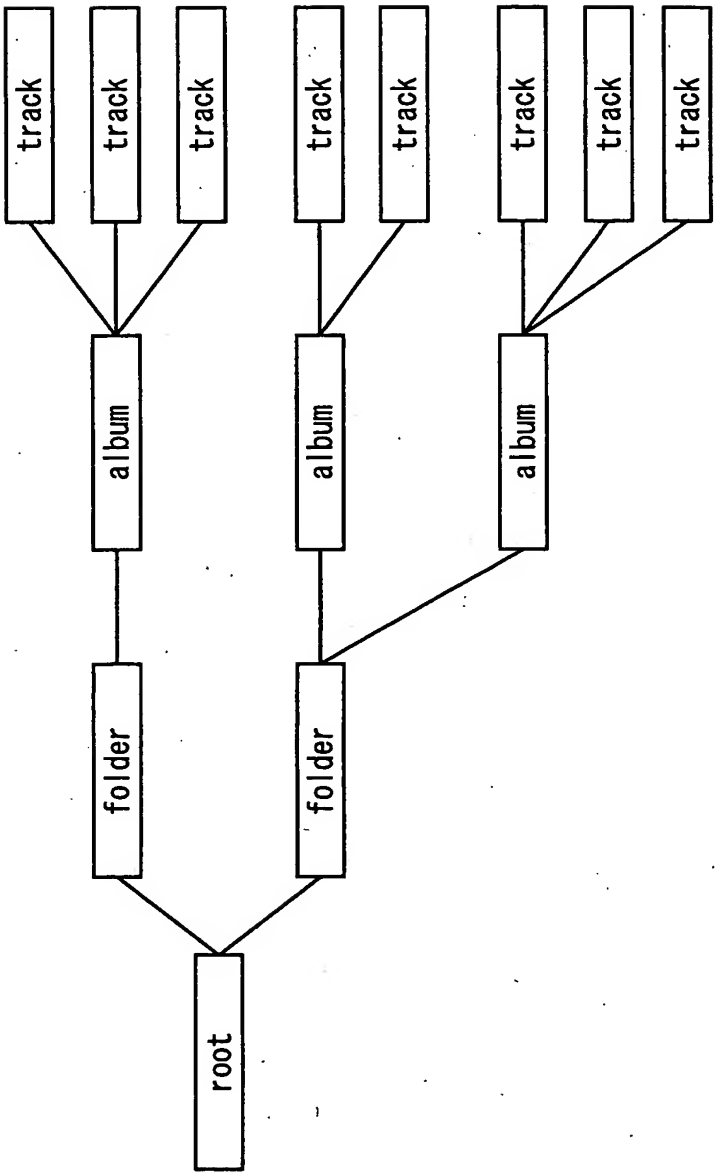
track
track
track
track
track
track
track
track
album
album
album
folder
folder
root

FIG. 6

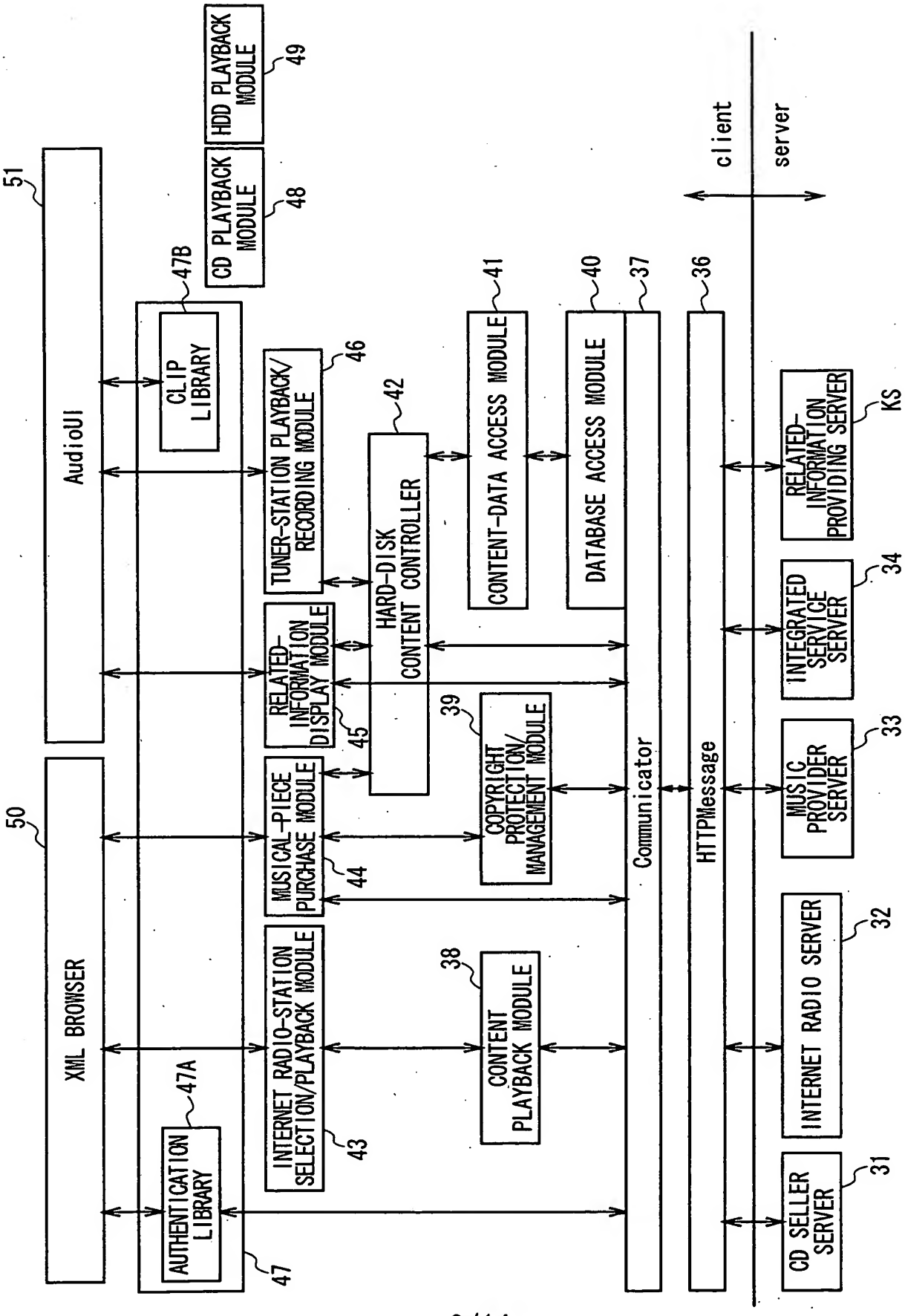
client
server
51
AudioUI
50
XML BROWSER
47
47A
AUTHENTICATION LIBRARY
47B
CLIP LIBRARY
48
CD PLAYBACK MODULE
49
HDD PLAYBACK MODULE
46
TUNER-STATION PLAYBACK/ RECORDING MODULE
42
HARD-DISK CONTENT CONTROLLER
41
CONTENT-DATA ACCESS MODULE
40
DATABASE ACCESS MODULE
37
Communicator
36
HTTPMessage
45
RELATED-INFORMATION DISPLAY MODULE
44
MUSICAL-PIECE PURCHASE MODULE
39
COPYRIGHT PROTECTION/ MANAGEMENT MODULE
43
INTERNET RADIO-STATION SELECTION/PLAYBACK MODULE
38
CONTENT PLAYBACK MODULE
RELATED-INFORMATION PROVIDING SERVER
KS
34
INTEGRATED SERVICE SERVER
33
MUSIC PROVIDER SERVER
32
INTERNET RADIO SERVER
31
CD SELLER SERVER

FIG. 7

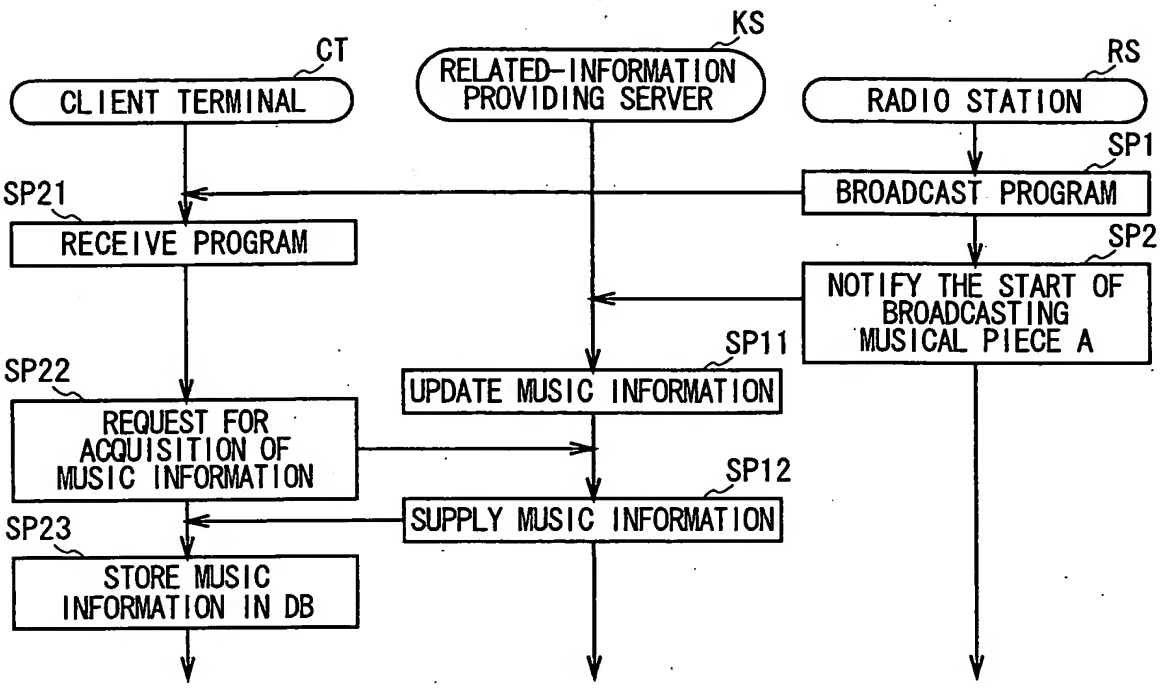
CT
CLIENT TERMINAL
KS
RELATED-INFORMATION PROVIDING SERVER
RS
RADIO STATION
SP1
BROADCAST PROGRAM
SP21
RECEIVE PROGRAM
SP2
NOTIFY THE START OF BROADCASTING MUSICAL PIECE A
SP11
UPDATE MUSIC INFORMATION
SP22
REQUEST FOR ACQUISITION OF MUSIC INFORMATION
SP12
SUPPLY MUSIC INFORMATION
SP23
STORE MUSIC INFORMATION IN DB

FIG. 8

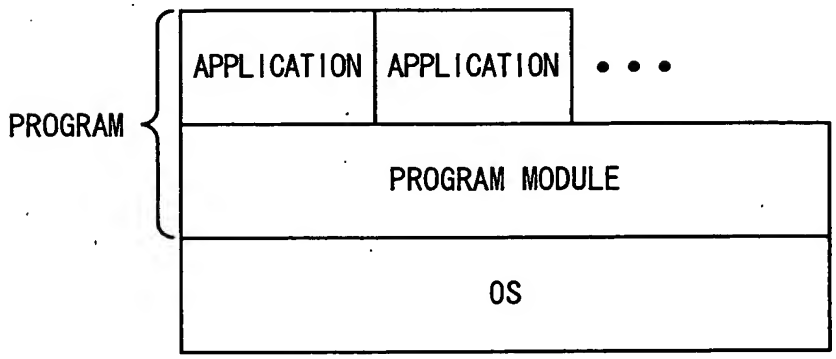
PROGRAM
APPLICATION
APPLICATION
• • •
PROGRAM MODULE
OS

FIG. 9

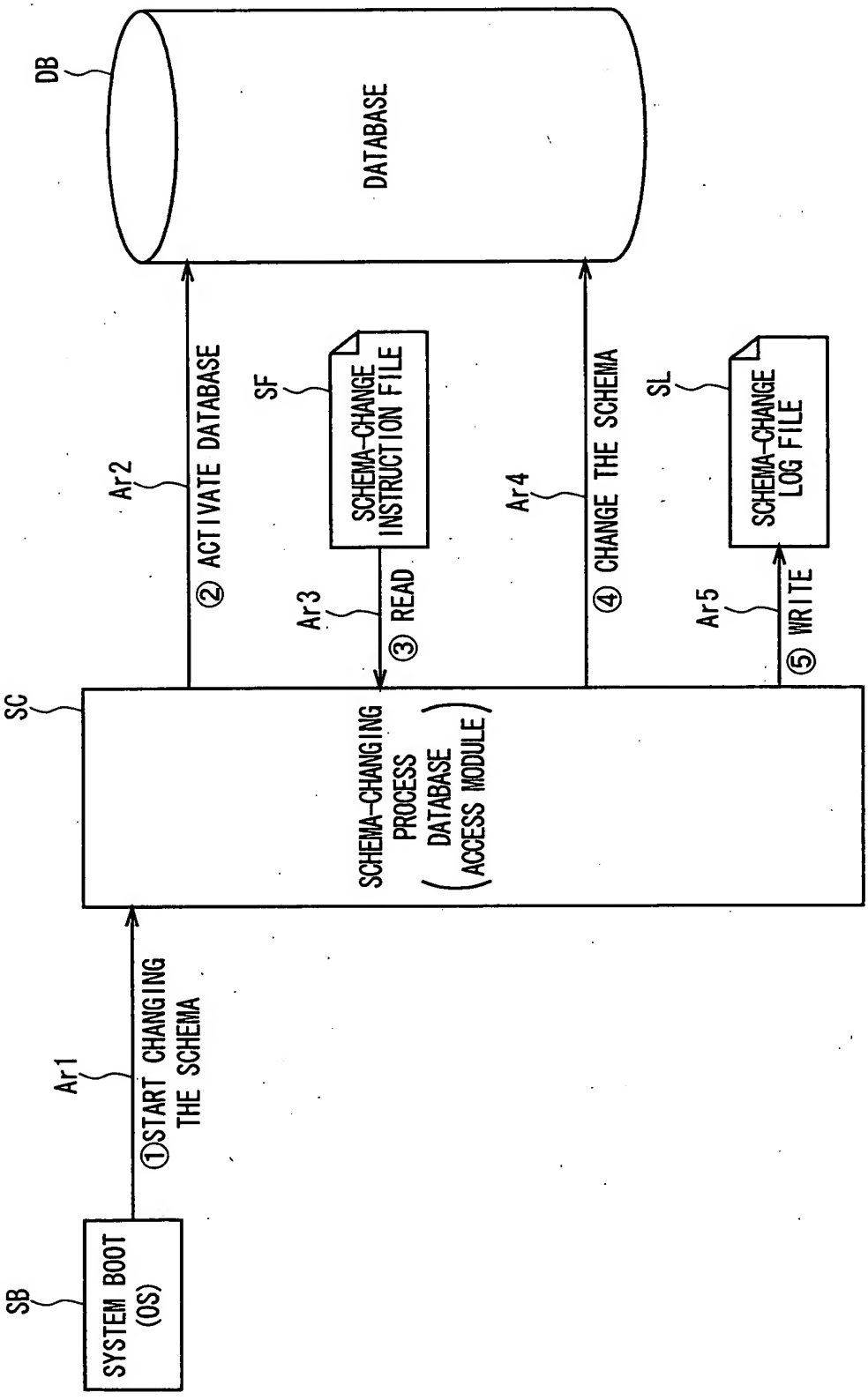
DB
DATABASE
SF
SCHEMA-CHANGE INSTRUCTION FILE
SL
SCHEMA-CHANGE LOG FILE
Ar2
② ACTIVATE DATABASE
Ar3
③ READ
Ar4
④ CHANGE THE SCHEMA
Ar5
⑤ WRITE
SC
SCHEMA-CHANGING PROCESS (DATABASE ACCESS MODULE)
Ar1
①START CHANGING THE SCHEMA
SB
SYSTEM BOOT (OS)

FIG. 10

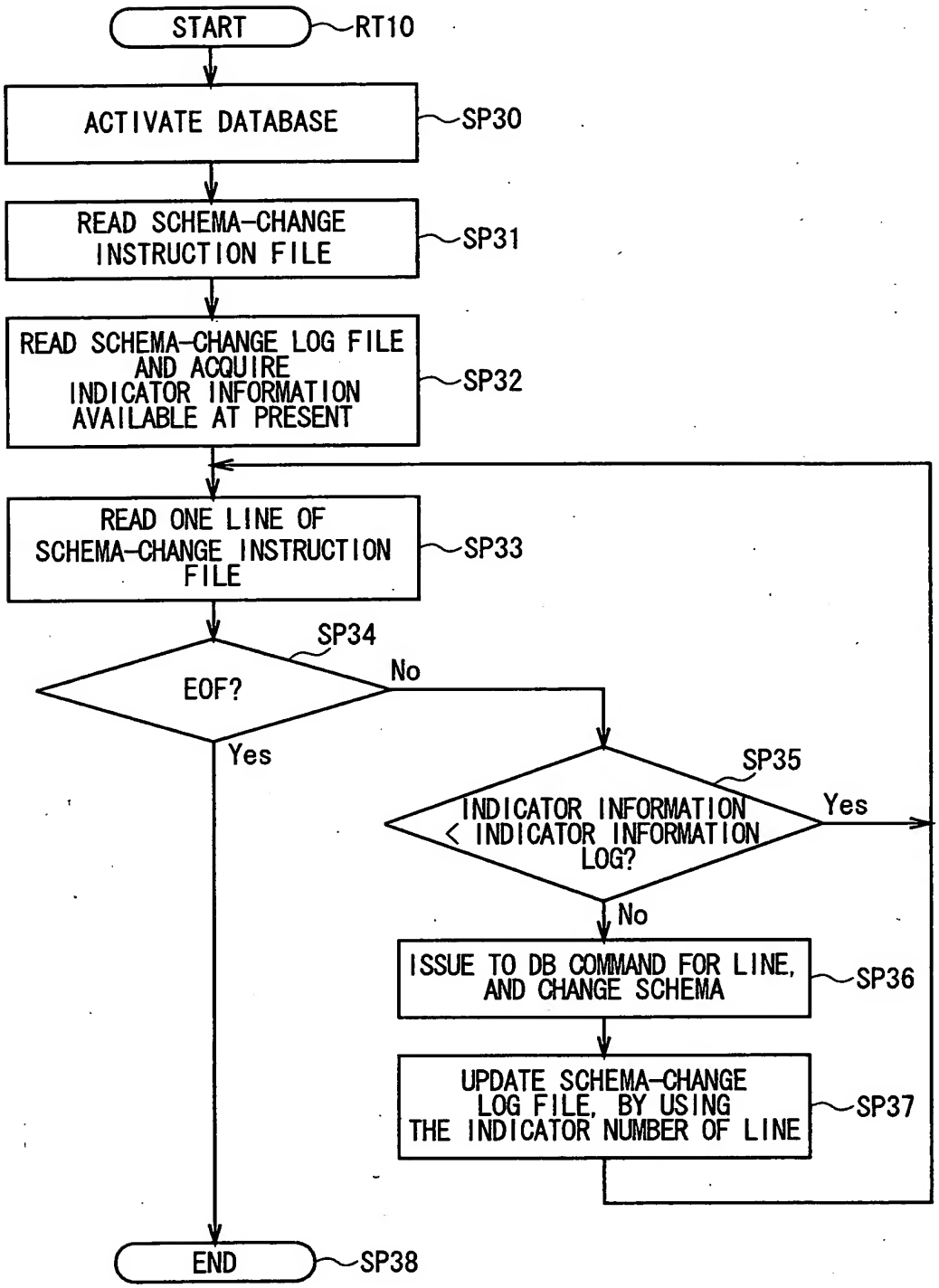
START
RT10
ACTIVATE DATABASE
SP30
READ SCHEMA-CHANGE INSTRUCTION FILE
SP31
READ SCHEMA-CHANGE LOG FILE AND ACQUIRE INDICATOR INFORMATION AVAILABLE AT PRESENT
SP32
READ ONE LINE OF SCHEMA-CHANGE INSTRUCTION FILE
SP33
SP34
EOF?
No
Yes
SP35
INDICATOR INFORMATION < INDICATOR INFORMATION LOG?
Yes
No
ISSUE TO DB COMMAND FOR LINE, AND CHANGE SCHEMA
SP36
UPDATE SCHEMA-CHANGE LOG FILE, BY USING THE INDICATOR NUMBER OF LINE
SP37
END
SP38

FIG. 11

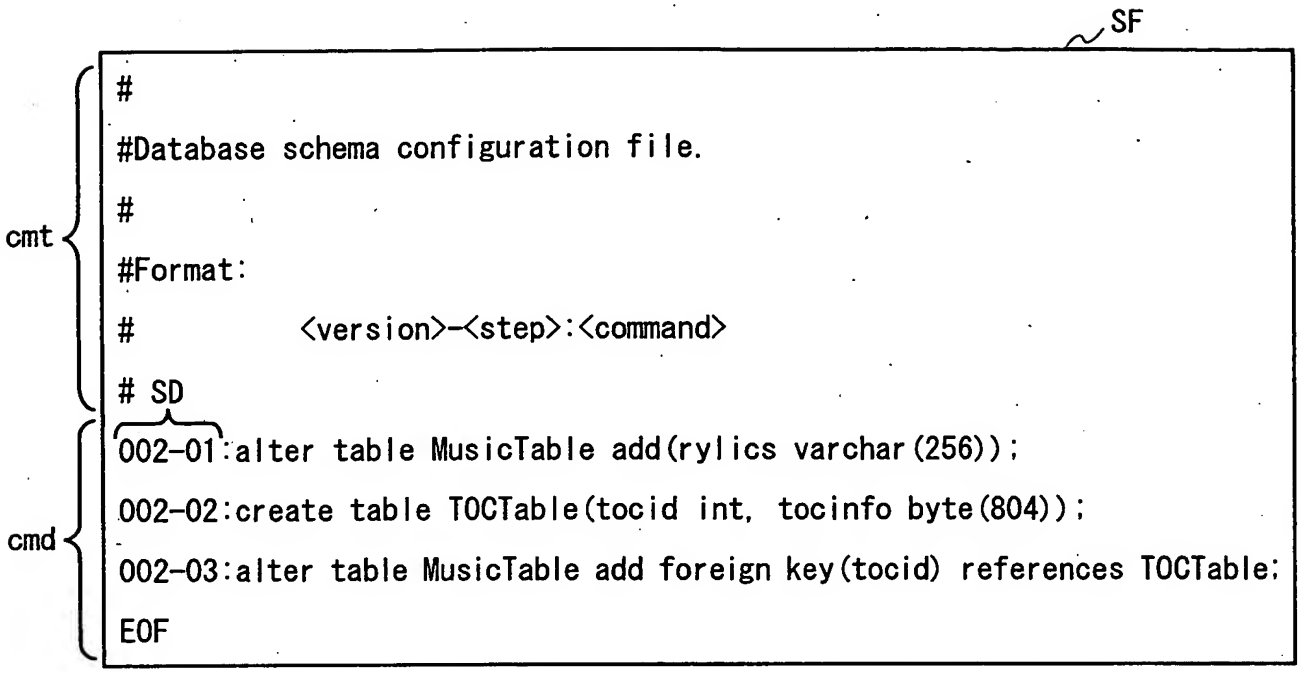

FIG. 12

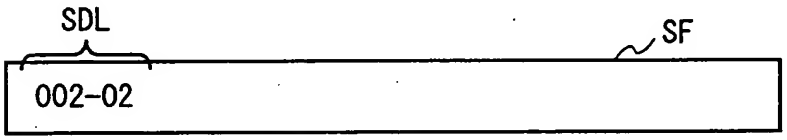

FIG. 13

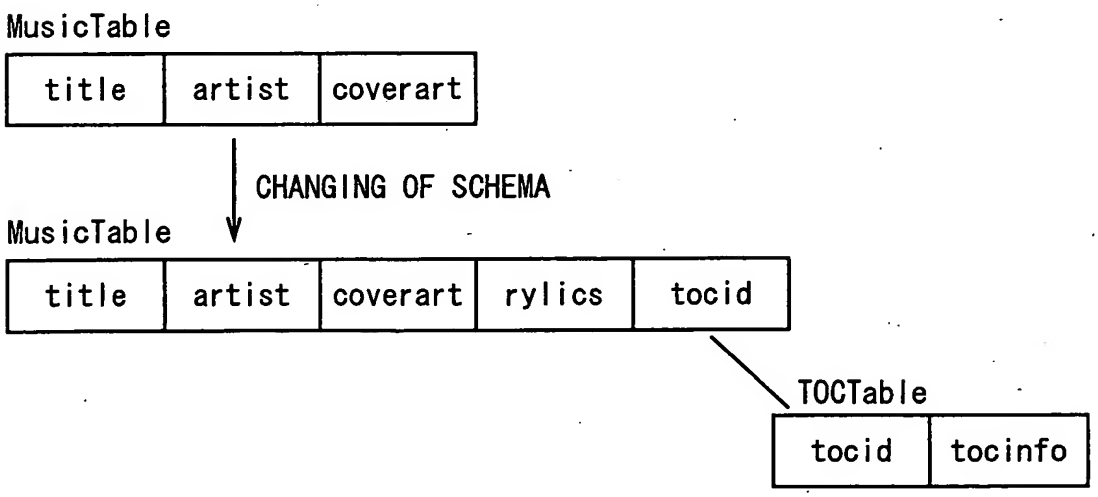

FIG. 14

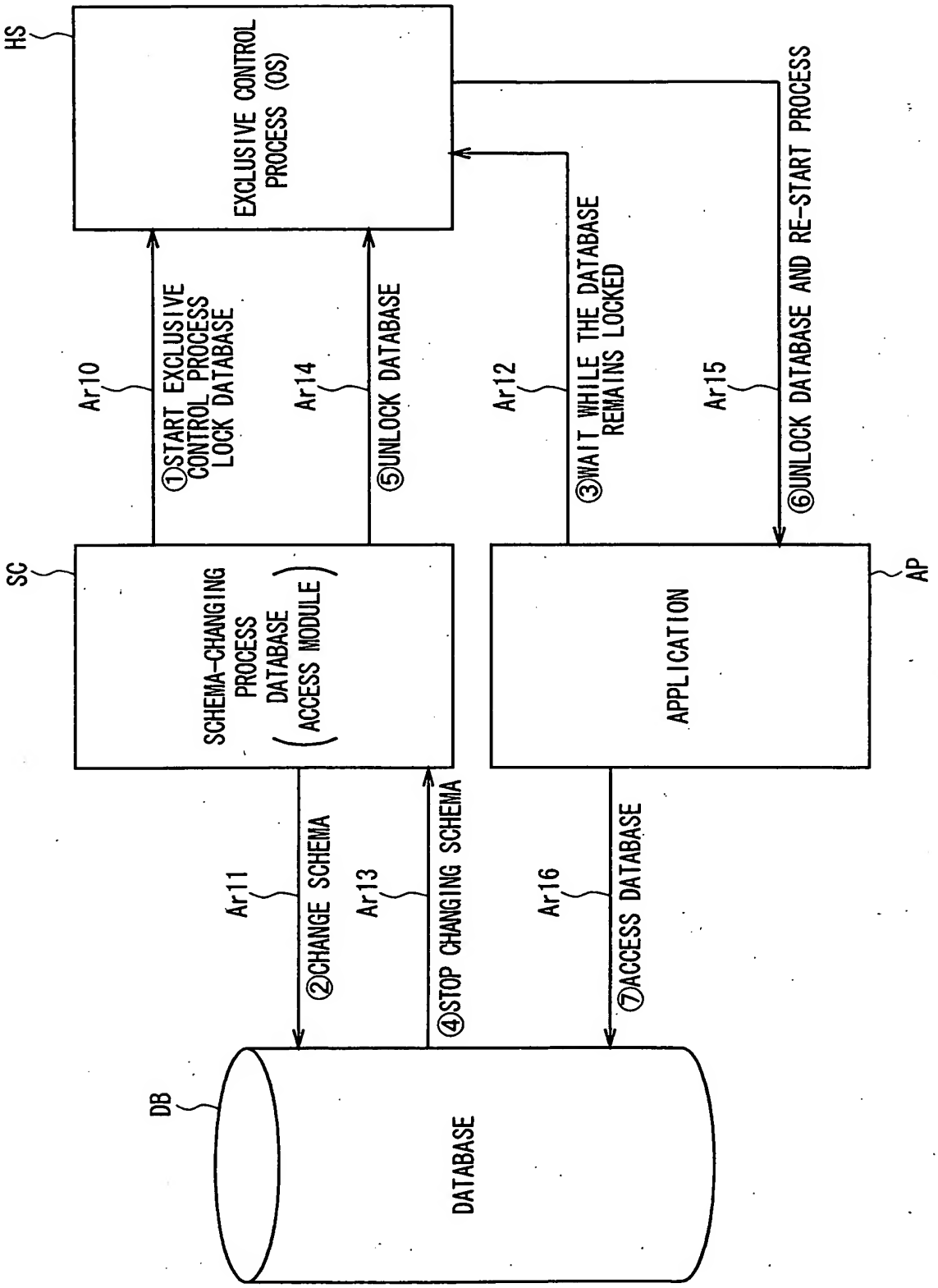
HS
EXCLUSIVE CONTROL PROCESS (OS)
Ar10
①START EXCLUSIVE CONTROL PROCESS LOCK DATABASE
Ar14
⑤UNLOCK DATABASE
Ar12
③WAIT WHILE THE DATABASE REMAINS LOCKED
Ar15
⑥UNLOCK DATABASE AND RE-START PROCESS
SC
SCHEMA-CHANGING PROCESS DATABASE (ACCESS MODULE)
AP
APPLICATION
Ar11
②CHANGE SCHEMA
Ar13
④STOP CHANGING SCHEMA
Ar16
⑦ACCESS DATABASE
DB
DATABASE

FIG. 15

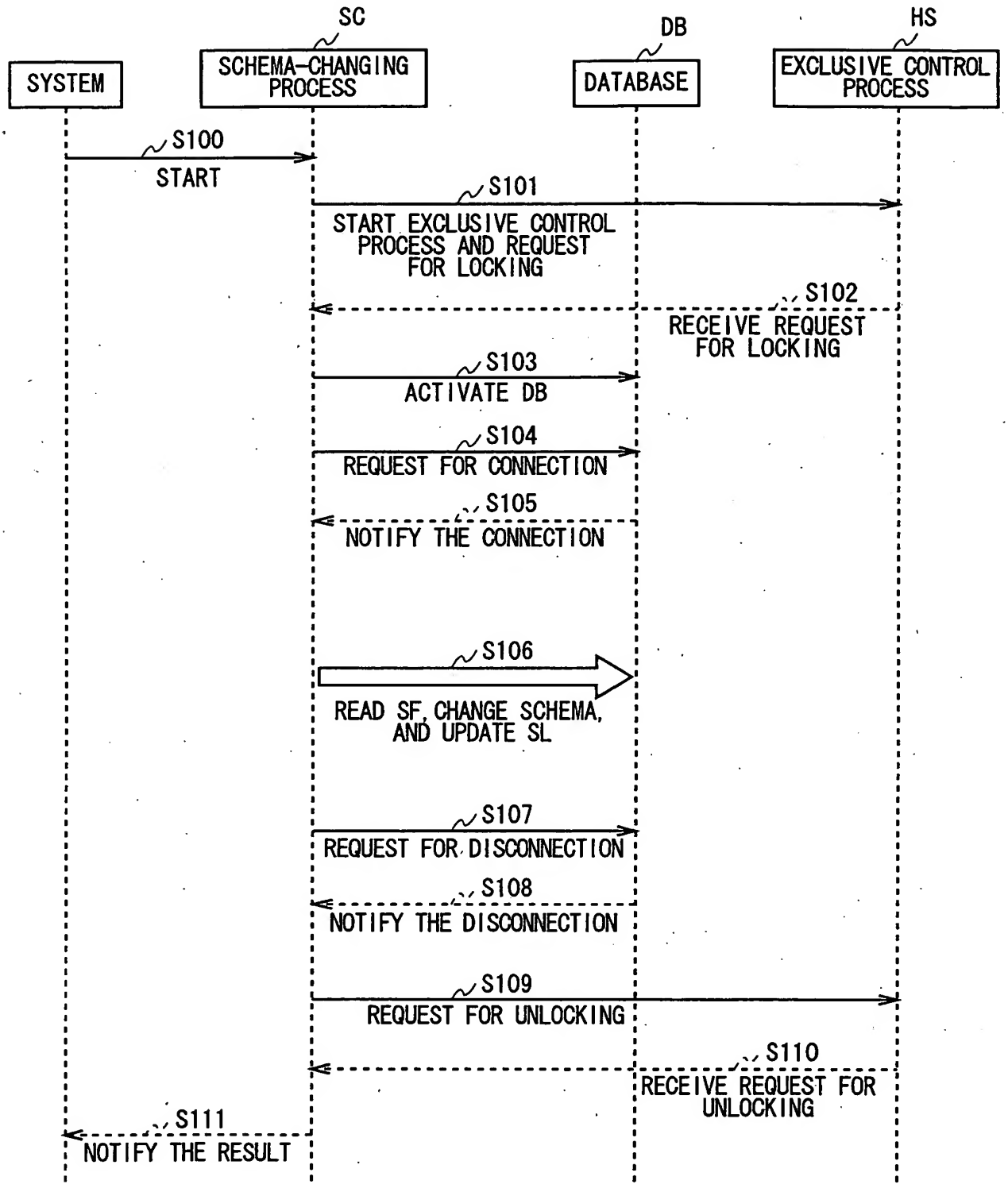
SC
DB
HS
SYSTEM
SCHEMA-CHANGING PROCESS
DATABASE
EXCLUSIVE CONTROL PROCESS
S100
START
S101
START EXCLUSIVE CONTROL PROCESS AND REQUEST FOR LOCKING
S102
RECEIVE REQUEST FOR LOCKING
S103
ACTIVATE DB
S104
REQUEST FOR CONNECTION
S105
NOTIFY THE CONNECTION
S106
READ SF, CHANGE SCHEMA, AND UPDATE SL
S107
REQUEST FOR DISCONNECTION
S108
NOTIFY THE DISCONNECTION
S109
REQUEST FOR UNLOCKING
S110
RECEIVE REQUEST FOR UNLOCKING
S111
NOTIFY THE RESULT

FIG. 16

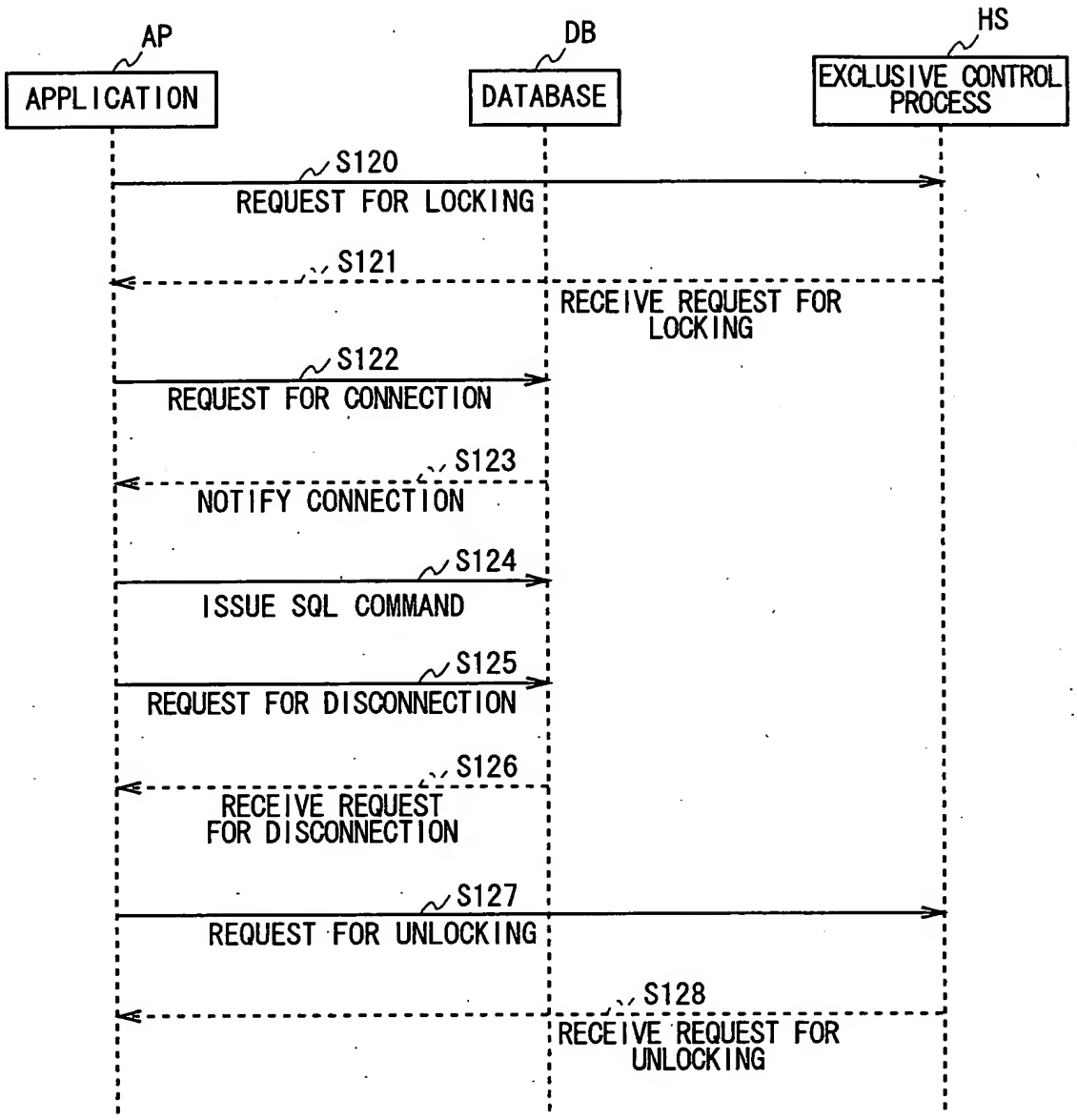
AP
APPLICATION
DB
DATABASE
HS
EXCLUSIVE CONTROL PROCESS
S120
REQUEST FOR LOCKING
S121
RECEIVE REQUEST FOR LOCKING
S122
REQUEST FOR CONNECTION
S123
NOTIFY CONNECTION
S124
ISSUE SQL COMMAND
S125
REQUEST FOR DISCONNECTION
S126
RECEIVE REQUEST FOR DISCONNECTION
S127
REQUEST FOR UNLOCKING
S128
RECEIVE REQUEST FOR UNLOCKING

FIG. 17

EXPLANATION OF REFERENCE SYMBOLS

1...INFORMATION PROVIDING SYSTEM, 2...NETWORK, 3...UPDATE-INFORMATION PROVIDING SERVER, CT...CLIENT TERMINAL, KS...RELATED-INFORMATION PROVIDING SERVER, RS...RADIO STATION, SF...SCHEMA-CHANGE INSTRUCTION FILE, SL...SCHEMA-CHANGE LOG FILE